

Choosing Suitable Times For
Prescribed Burning
In Southern New Jersey

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INTRODUCTION

PREScribed BURNING IS useful in managing pine-oak forests in the Pine Region of southern New Jersey. It favors reproduction of pine by preparing suitable seedbeds; it checks the development of hardwood reproduction; and it protects against wild fires by reducing the amount of fuel on the forest floor (3, 5, 6).

¹STATIONED AT THE LEBANON EXPERIMENTAL FOREST, NEW LISBON, N.J., WHICH IS MAINTAINED BY THE NORTHEASTERN FOREST EXPERIMENT STATION IN COOPERATION WITH THE NEW JERSEY DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT, BUREAU OF FORESTRY, PARKS, AND HISTORIC SITES.

Prescribed burns are now being used on both State and private lands in southern New Jersey. Foresters select the areas to be treated, map the operations, and suggest other silvicultural practices and improvements (such as roads and firebreaks) to be used in conjunction with the burning treatments. The actual burning is done by trained crews whose wages are paid by the owner. The State Department of Conservation recommends qualified crews, and all burning is done under permits issued by this Department.

The ideal fires for these periodic burning treatments are light (3). Usually the flames are so low on upland sites that a man can readily walk through them; the flames generally rise not more than a foot or two above the ground. Such fires do not consume all the fuel, but they lessen the depth of it greatly.

This type of fire should be obtained, if possible, when burning with the wind. Although fires set against the wind have given satisfactory results, they spread more slowly, and are much more costly, than fires set with the wind (4). And since upwind fires require drier fuel, they may cause excessive damage if the wind shifts.

Using fire this way as a silvicultural tool is still more an art than a science. Experience and skill are necessary to obtain fires of the desired intensity. The biggest problem of all in using prescribed fires is to choose the suitable time for burning.

CHOOSING THE PROPER TIME

Choosing the proper time is highly important in getting a satisfactory fire. When fuels are too dry or the wind is too strong, the fire may cause excessive damage. At the other extreme, when fuels are too wet, much time may be wasted. Attempts to burn on unsuitable days have increased the cost of treating certain tracts by as much as 400 percent.

Winter Months Are Best

The winter months have been found the best for prescribed burning in southern New Jersey. Suitable conditions

are usually found between Christmas and March 1--although in some years they have been found as early as December 1 and as late as March 20.

During this period changes in fuel moisture are relatively slow; so there is less chance that fires will increase greatly in intensity during the burning of a tract. There is also less danger of heat injury to trees during this period. The chance of killing the foliage of young pines is much less when air temperatures are below 50° F. than on warmer days.

However, the number of days suitable for prescribed burning during a winter is limited. During the winter of 1946-47 there were 38 suitable days; the winters of 1947-48 and 1949-50 offered only 20 days each.

Choosing The Right Day

In choosing the right day for making a prescribed-burning treatment, the fire-danger-rating system developed by the U. S. Forest Service for use in the eastern United States (1) can be used as a guide.

A word of caution is needed here. One must bear in mind that the fire-danger-rating system was not designed for this purpose. It was designed primarily to help forest-protection workers predict when accidental forest fires are likely to occur during fire seasons.

In prescribed burning, the fire-danger ratings can serve only as rough guides to fire behavior and intensity. They cannot be expected to provide exact measures of burning conditions. Their main usefulness in prescribed burning is in setting the upper and lower limits of probable burning conditions.

In 4 years' experience with prescribed burning in southern New Jersey, successful burns have been made when the danger rating was as low as 3; and safe burns have been made when the danger rating was as high as 30.² However,

²FUEL MOISTURE, WIND VELOCITY, CONDITION OF THE VEGETATION, AND SEASON OF THE YEAR ARE THE FACTORS USED IN PREDICTING FIRE DANGER. THESE ARE INTEGRATED ON A FIRE-DANGER METER, WHICH INDICATES THE DANGER RATING ON A 100-POINT SCALE.

when ratings approach 30, conditions are likely to be too dangerous for burning. The greatest proportion of satisfactory burning days (75 percent) occurred when the danger ratings were between 10 and 15. Of all the days that had ratings between 5 and 25, 63 percent were favorable for burning.

Within this range of fire-danger ratings, however, one must rely on judgment and experience to determine local burning conditions. Flammability varies greatly according to many factors, including topography, kind of stand, fuel type, amount of fuel, and past and present weather conditions.

For example, in winters of below-normal precipitation most of the burning has been done at low (5-10) danger ratings, and in winters of above-normal precipitation at higher (10-25) danger ratings.

Effect of weather conditions.--Suitable times for burning when the fire-danger rating is relatively high (20-30) are usually in periods when past precipitation has had a greater effect on natural fuels than the fire-danger measurement indicates. For example, cool moist weather between storms has sometimes caused a difference between fire-danger rating and actual flammability.

Suitable times for burning when the danger rating is very low usually follow periods of higher danger. Then the duff may be dry enough for satisfactory burns, although the measured danger rating is very low because of (1) little wind and (2) the effect of a heavy frost, dew, or light rain or snow.

Effect of fuel type.--Burning conditions in southern New Jersey vary appreciably with the local fuel or forest type. On upland sites, the actual flammability may be lower in pure pine stands than in pure oak stands during the dormant season. This is partly because the pines provide more shade, partly because the pine needles form a more compact and slower-drying litter than oak leaves. Consequently, prescribed fires in several upland tracts have died out, or lessened greatly in intensity, under clumps of pine. Also, on some days when actual flammability was too high for burning oak-pine stands, stands of nearly pure pine could be treated.

Although the open canopies in pine-scrub oak stands permit higher wind velocities and more rapid drying of fuels (2), the actual flammability may sometimes be lower than in oak-pine stands. This is because scrub oak leaves are smaller, form a more compact litter, and provide less duff than black, white, and chestnut oaks. (In these respects scrub oaks are more like southern red and pin oaks.) As a result, some prescribed fires have not burned in spots where 20-year-old scrub oaks formed dense thickets, even though they spread through the arborescent oak areas. And stands of pitch pine and scrub oaks have been successfully treated at times when the flammability was too high for burning oak-pine stands.

Pine swamps have moister soils, usually more open overstories, and more fuel in shrubs and duff. Thus, pine swamps have sometimes been too wet to prescribe-burn, or at other times would burn too hard, when at the same times oak-pine stands have been treated successfully.

Effect of amount of fuel.---In all fuel types, suitable times for prescribed burning vary with the amount of fuel. In areas being treated for the first time the fuel is usually more abundant and more continuous than in previously prescribe-burned areas. Consequently, if the first prescribed fire is to be light a time must be chosen when much of the lower fuel is too wet to ignite. In contrast, the more frequently and more recently the area has been treated, the less fuel is usually available; then a burn can be made at the higher fire-danger ratings and still produce a light fire.

However, there are some days that provide suitable conditions for both initial burns and reburns. On these days the litter may be dry, underlying duff wet, air temperatures relatively low, and the wind light.

Time Of Day

Time of day is important too. Usually burning conditions build up to a peak of severity in the early afternoon. Hence more care has to be taken in firing tracts in the morning than in afternoon or evening, because there is a much greater chance that morning fires may later increase in intensity.

RECOMMENDATIONS

Use Of Fire-Danger Ratings

Subject to the cautions that have been pointed out, fire-danger ratings can be used as a rough guide in determining suitable times for prescribed burning as follows:

In oak-pine stands.--Satisfactory burns can probably be made at fire-danger ratings of 10 to 15, sometimes at ratings of 5 to 10 or 10 to 20.

In upland pine stands.--The range of danger ratings on days suitable for burning upland pine stands is similar to the range for oak-pine stands--but more flexible. Sometimes upland pine stands have been burned when fuels in oak-pine stands were too dry for safe burning. Sometimes they have been burned at low danger ratings. Usually these times--as in oak-pine stands--were during or just after a light precipitation that followed a dry period.

In pine-swamp stands.--Danger ratings have been less useful in predicting burning conditions for pine swamps. Satisfactory burns of pine swamps have been made at ratings of 5 to 20. Unsuccessful attempts have been made, because of too-dry fuels, at ratings of 3 and up; and, because of too-wet fuels, at ratings of 25 and less. Only 35 percent of the attempts to burn pine swamps with light prescribed fires have been successful.

Use Of Test Fires

A test fire may be used to check actual burning conditions against the fire-danger rating and local fuel conditions.

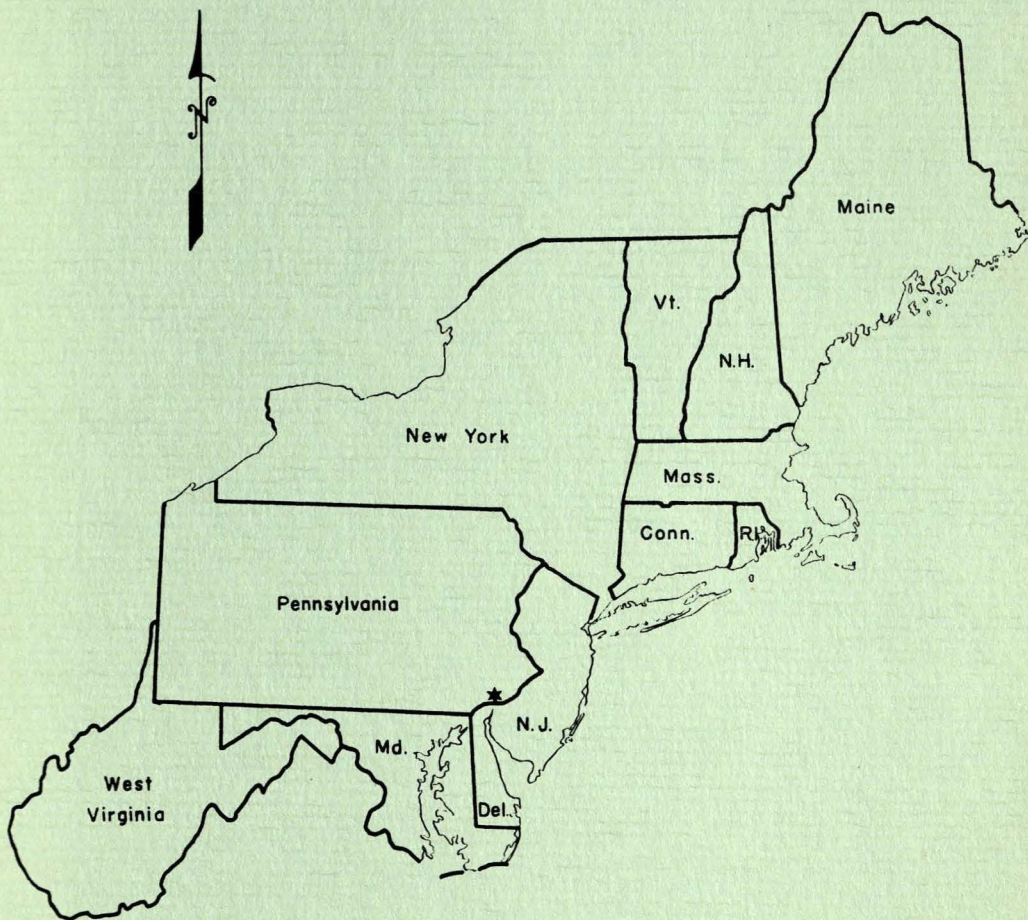
Usually a small patch of litter in the woods is used. If a carefully placed lighted match will start a fire of slightly less than the desired intensity, then an attempt to burn tracts having similar fuel can be made.

If there is any question about how a fire will behave, the usual procedure is to try first a "backing" fire, changing to a "quartering" fire, and then to a headfire if the behavior of the fire indicates that the change will be

satisfactory. Because all of the perimeter of a tract is usually fired anyway, that procedure does not greatly increase the cost of burning. Under proper conditions, the use of both headfire and backfire in a tract does not cause a damaging flare-up when they meet.

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